FINAL

KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSEMENT

GRADE 12

MATHEMATICS P2

JUNE 2026

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 15 pages.

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QUESTION 1

1.1	$\frac{7d-2}{5}=15$ $7d-2=75$ $7d=77$ $d=11$	✓A $7d-2$ ✓A equation ✓A simplification (3)
1.2	22 ; 12 ; 13 ; 8 ; 20 $\sigma = 5,22$ Answer only: Full marks	✓A data values ✓CA answer (2)
1.3.1	The mean will increase	✓A increase (1)
1.3.2	The standard deviation will remain the same	✓A remain the same (1)
		[7]

QUESTION 2

2.1

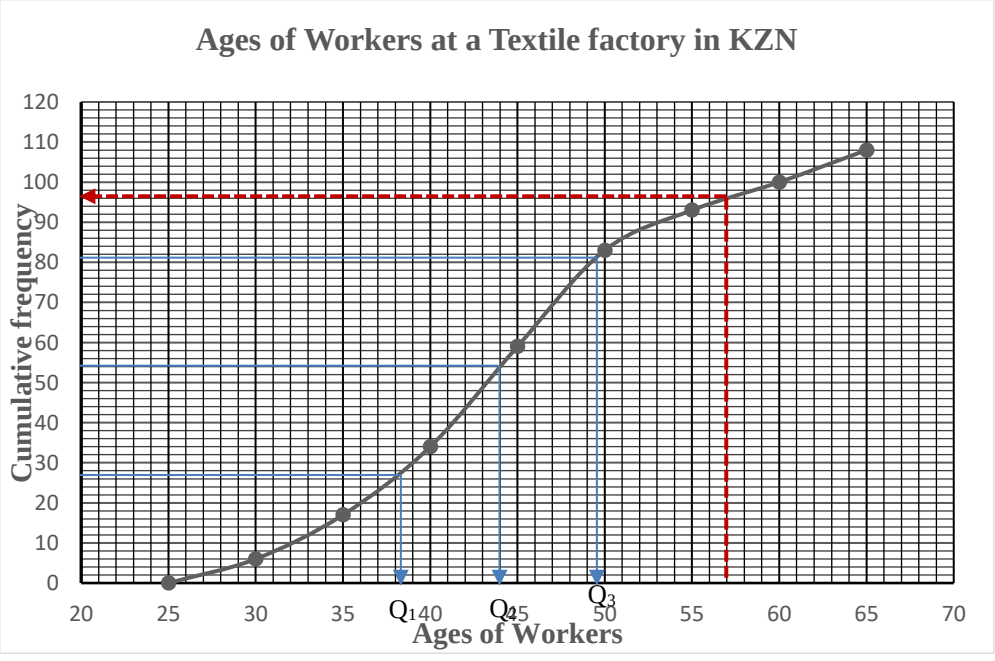
AGE	FREQUENCY	CUM. FREQ
$25 < x \leq 30$	6	6
$30 < x \leq 35$	11	17
$35 < x \leq 40$	17	34
$40 < x \leq 45$	25	59
$45 < x \leq 50$	24	83
$50 < x \leq 55$	10	93
$55 < x \leq 60$	7	100
$60 < x \leq 65$	8	108

✓A 34

✓CA 108

(2)

2.2



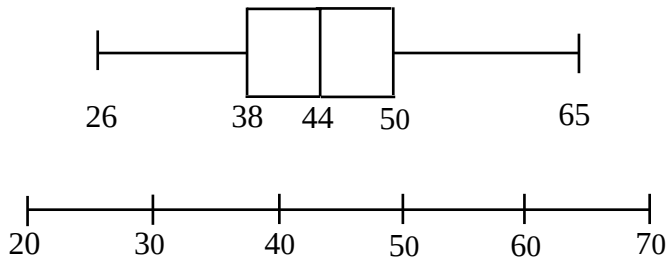
✓A grounding ogive

✓CA plotting at upper limits

✓CA accurate points

✓CA smooth curve

(4)

2.3		Plotted on box and whisker diagram: ✓A 26 and 65 ✓CA 38 (accept 37 – 39) ✓CA 44 (accept 43 – 45) ✓CA 50 (accept 49 – 51) (4)
2.4.1	108 – 96 = 12 workers $\frac{12}{108}\times 100 = 11\%$	✓A 12 (accept 11 – 13) ✓CA 11% (2)
2.4.2	more skewed to the right	✓A answer (1)
		[13]

QUESTION 3

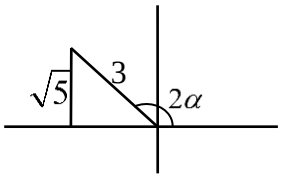
3.1	Angle of inclination of $PS = 116,5°$ $m_{PS} = \tan 116,5° = -2$	✓A angle of inclination ✓CA answer (2)
3.2	$y = -2x + 4$	✓CA answer (1)
3.3	Substitute $S(4;k)$ in: $y = -2x + 4$ $k = -2(4) + 4$ $= -4$	✓CA substitution (1)
3.4	At Q: $0 = -2x + 4$ $x = 2$ $\therefore Q(2\ ;\ 0)$ and $OQ = 2$ units since $OQ : QR = 1 : 4$ $R(8\ ;\ 0)$ and $OR = 8$ units $\therefore QR = 6$ units	✓CA $0 = -2x + 4$ ✓CA $x = 2$ ✓CA $OR = 8$ ✓CA $QR = 6$ (4)
3.5	$M\left(\frac{0+8}{2}\ ;\ \frac{4+0}{2}\right)$ $M(4\ ;\ 2)$	✓CA x-coordinate ✓CA y-coordinate (2)
3.6	$m_{QM} = \frac{2-0}{4-2} = 1$ $m_{PR} = \frac{0-4}{8-0} = -\frac{1}{2}$ M is the midpoint of PR, but, $m_{QM} \times m_{PR} = 1 \times -\frac{1}{2} = -\frac{1}{2}$ $-\frac{1}{2} \neq -1$ $\therefore$ BM cannot be the perpendicular bisector	✓CA m_{QM} ✓CA m_{PR} ✓CA calculating $m_{QM} \times m_{PR}$ ✓CA $-\frac{1}{2} \neq -1$ (4)
3.7	MS = $2 - (-4) = 6$ units Area of $\Delta MQS = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 6 \times 2 = 6$ units^2 Area of $\Delta MTS = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 6 \times 6 = 18$ units^2 Area of quadrilateral QSTM = Area of ΔMQS + Area of ΔMTS $= 6 + 18 = 24$ units^2	✓CA length of MS ✓CA Area of ΔMQS ✓CA Area of ΔMTS ✓CA answer (4)
		[18]

QUESTION 4

4.1	$(x+3)^2+(y-2)^2=12+9+4$ $(x+3)^2+(y-2)^2=25$ $\text{L}(-3\,;2)$ $r=5$	✓A LHS of equation ✓A RHS of equation ✓CA $\text{L}(-3\,;2)$ ✓CA $r=5$ (4)
4.2	$(-3-0)^2+(2-y)^2=25$ $29+4-4y+y^2=25$ $y^2-4y-12=0$ $(y-6)(y+2)=0$ $y=6$ or $y=-2$ $\therefore \text{S}(0\,;6)$	✓CA substitution ✓CA standard form ✓CA factors ✓CA coordinates of S (4)
4.3	$\text{m}_{\text{LS}}=\dfrac{6-2}{0-(-3)}$ $\text{m}_{\text{LS}}=\dfrac{4}{3}$ $\text{m}_{\text{SG}}=-\dfrac{3}{4}$ $y=-\dfrac{3}{4}x+6$ At G: $0=-\dfrac{3}{4}x+6$ $\dfrac{3}{4}x=6$ $x=8$ $\therefore \text{G}(8\,;0)$ **OR** $\text{m}_{\text{SG}}=\dfrac{6-0}{0-x}=-\dfrac{3}{4}$ $\dfrac{6}{-x}=-\dfrac{3}{4}$ $x=8$	✓CA m_{LS} ✓CA $\text{m}_{\text{SG}}=-\dfrac{3}{4}$ ✓CA substitute in equation of SG **OR** substitute in gradient of SG ✓CA coordinates of G (4)
4.4	$\tan \text{S}\hat{\text{G}}\text{H}=-\dfrac{3}{4}$ $\text{S}\hat{\text{G}}\text{H}=143{,}13°$ $\text{O}\hat{\text{S}}\text{G}+90°=143{,}13°$ [ext $\angle$ of ΔOSG] $\text{O}\hat{\text{S}}\text{G}=53{,}13°$ $\therefore \theta=126{,}87°$	✓CA $\tan \text{S}\hat{\text{G}}\text{H}=-\dfrac{3}{4}$ ✓CA $\text{S}\hat{\text{G}}\text{H}=143{,}13°$ ✓CA $\text{O}\hat{\text{S}}\text{G}=53{,}13°$ ✓CA answer (4)

4.5	$L\hat{S}G = M\hat{G}S = 90°$ $[\tan \perp \text{rad}]$ $\therefore$ LS || MG $[\text{co-int. } \angle\text{s suppl.}]$ LS = MG [equal radii] $\therefore$ LMGS is a parallelogram [one pair opp. sides = and ||] Also: LMGS is a rectangle [a parm. with an angle of $90°$]	✓A showing LMGS is a parm. ✓A showing LMGS is a rectangle (2)
4.6	Using translation: Coordinates of M: $(5 ; -4)$ Equation of circle with centre M: $(x-5)^2 + (y+4)^2 = 25$ **OR** Midpoint of LG $= \left(\frac{-3+8}{2} ; \frac{2+0}{2}\right) = \left(\frac{5}{2} ; 1\right)$ The diagonals of LMGS bisect since LMGS is a rectangle. Let M be the point $(a ; b)$. $\frac{a+0}{2} = \frac{5}{2}$ and $\frac{b+6}{2} = 1$ $\therefore a = 5$ and $b = -4$ $M(5 ; -4)$ $(x-5)^2 + (y+4)^2 = 25$	✓CA *x*-coordinate of M ✓CA *y*-coordinate of M ✓CA answer **OR** ✓CA *x*-coordinate of M ✓CA *y*-coordinate of M ✓CA answer (3)
		[21]

QUESTION 5

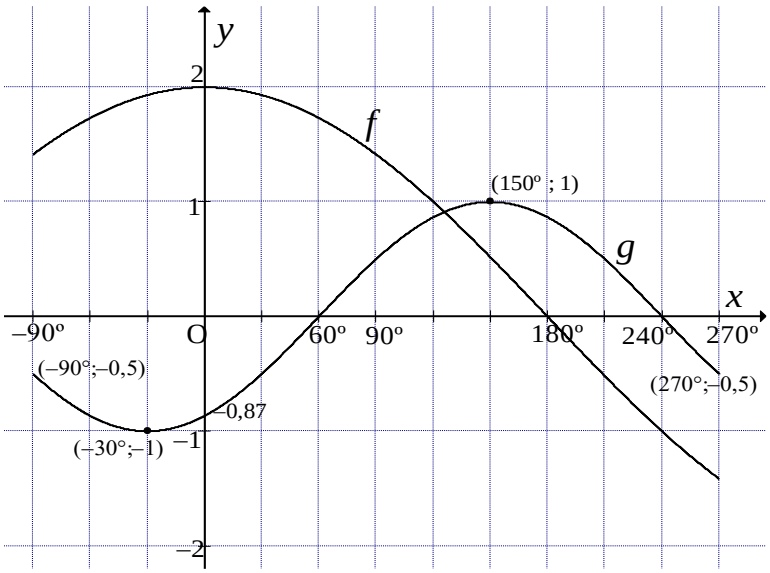
5.1.1	$\sin 2\alpha = \frac{\sqrt{5}}{3}$ $x^2 = 3^2 - \left(\sqrt{5}\right)^2$ [Pythagoras] $x = -2$ $\tan 2\alpha = -\frac{\sqrt{5}}{2}$ 	✓A substitution ✓A value of x ✓CA answer (3)
5.1.2	$\cos 2\alpha = -\frac{2}{3}$ $1 - 2\sin^2\alpha = -\frac{2}{3}$ $2\sin^2\alpha = \frac{5}{3}$ $\sin^2\alpha = \frac{5}{6}$ $\sin\alpha = \sqrt{\frac{5}{6}}$	✓CA value of $\cos 2\alpha$ ✓CA double $\angle$ expansion (CA is on $-\frac{2}{3}$) ✓CA simplification ✓CA answer (4)
5.2	$\tan^2(180° - \theta).\sin^2(90° + \theta) - \cos(\theta - 180°).\cos\theta$ $= (-\tan\theta)^2.(\cos\theta)^2 - (-\cos\theta).\cos\theta$ $= \tan^2\theta.\cos^2\theta + \cos^2\theta$ $= \frac{\sin^2\theta}{\cos^2\theta}.\cos^2\theta + \cos^2\theta$ $= \sin^2\theta + \cos^2\theta$ $= 1$	✓A $-\tan\theta$ ✓A $\cos\theta$ ✓A $-\cos\theta$ ✓CA quotient identity ✓CA answer (5)

5.3.1	LHS $=\frac{\cos 5x\cos 3x+\sin 3x\sin 5x}{\cos x-\sin x}$ $=\frac{\cos 5x\cos 3x+\sin 5x\sin 3x}{\cos x-\sin x}$ $=\frac{\cos(5x-3x)}{\cos x-\sin x}$ $=\frac{\cos 2x}{\cos x-\sin x}$ $=\frac{\cos^2 x-\sin^2 x}{\cos x-\sin x}$ $=\frac{(\cos x+\sin x)(\cos x-\sin x)}{\cos x-\sin x}$ $=\cos x+\sin x$ $=$ RHS	✓A using compound $\angle$ expansion ✓A double $\angle$ expansion ✓A factorisation (3)
5.3.2	Undefined when: $\cos x-\sin x=0$ $\cos x=\sin x$ $\tan x=1$ $x=45°+k.180°,\ k\in\mathbb{Z}$ For $x\in[-180°;180°]$: $x=-135°$ or $x=45°$	✓A $\cos x-\sin x=0$ ✓A $\tan x=1$ ✓CA answer ✓CA answer (4)
		[19]

QUESTION 6

6.1	$2\cos 2x-\sin x+1=0$ $2\left(1-2\sin^2 x\right)-\sin x+1=0$ $2-4\sin^2 x-\sin x+1=0$ $-4\sin^2 x-\sin x+3=0$ $4\sin^2 x+\sin x-3=0$ $\left(4\sin x-3\right)\left(\sin x+1\right)=0$ $\sin x=\frac{3}{4}$ or $\sin x=-1$ $x=48,59°+k.360°,\ k\in\mathbb{Z}$ or $x=131,41°+k.360°,\ k\in\mathbb{Z}$ or $x=270°+k.360°,\ k\in\mathbb{Z}$ $k\in\mathbb{Z}$: at least once.	✓A double $\angle$ identity ✓CA standard form ✓CA factorisation ✓CA both equations ✓CA $x=48,59°+k.360°$ ✓CA $x=131,41°+k.360°$ ✓CA or $x=270°+k.360°$ (7)
6.2	$\sqrt{3}\cos\beta+\sin\beta$ $=2\left(\frac{\sqrt{3}}{2}\cos\beta+\frac{1}{2}\sin\beta\right)$ $=2\left(\sin 60°\cos\beta+\cos 60°\sin\beta\right)$ $=2\sin\left(60°+\beta\right)$ $\therefore k=2$ and $m=60$	✓A $2\left(\frac{\sqrt{3}}{2}\cos\beta+\frac{1}{2}\sin\beta\right)$ ✓A $\sin 60°$ and $\cos 60°$ ✓A $k=2$ ✓A $m=60$ (4)
		[11]

QUESTION 7

7.1	period = $720°$	✓A answer (1)
7.2		✓A shape ✓A turning points ✓A intercepts with axes ✓A end points (4)
7.3	translation of $30°$ to the right **OR** translation of $390°$ to the right **OR** translation of $330°$ to the left Also accept any other correct answer.	✓A number of degree translated ✓A direction of translation (2)
7.4.1	$-90° \le x \le 180°$ **OR** $x \in [-90° ; 180°]$	✓A✓A answer **OR** ✓A✓A answer (2)
7.4.2	$60° < x < 180°$ or $240° < x \le 270°$ **OR** $x \in (60° ; 180°)$ or $(240° ; 270°]$	✓CA answer ✓CA ✓CA answer **OR** ✓CA answer ✓CA ✓CA answer (3)
		[12]

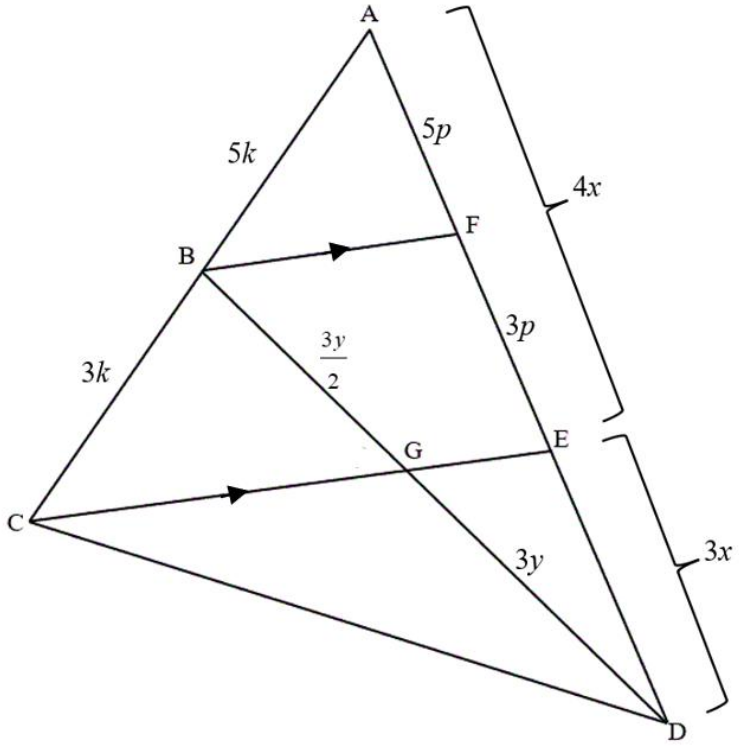
QUESTION 8

8.1	$\frac{\text{CB}}{\sin 2x} = \frac{k}{\sin(90° - x)}$ $\text{CB} = \frac{k.\sin 2x}{\sin(90° - x)}$ $\text{CB} = \frac{k.2\sin x\cos x}{\cos x}$ $\text{CB} = 2k\sin x$	✓A application of sine rule ✓A double $\angle$ expansion ✓A co-ratio (3)
8.2	$\cos x = \frac{\text{CB}}{\text{HC}}$ $\cos x = \frac{2k\sin x}{\text{HC}}$ $\text{HC} = \frac{2k\sin x}{\cos x}$ $\text{HC} = 2k\tan x$	✓A trig ratio ✓A $\text{HC} = \frac{2k\sin x}{\cos x}$ (2)
8.3	$\text{HC} = 2(40)\tan 23°$ $\text{CD}^2 = \text{HC}^2 + \text{HD}^2 - 2(\text{HC})(\text{HD})\cos\theta$ $40^2 = \left(2(40)\tan 23°\right)^2 + 30^2 - 2\left(2(40)\tan 23°\right)(30)\cos\theta$ $\cos\theta = \frac{\left[2(40)\tan 23°\right]^2 + 30^2 - 40^2}{2\left[2(40)\tan 23°\right](30)}$ $\cos\theta = 0,2224046183...$ $\theta = 77,15°$	✓A applying cosine rule ✓A substitution ✓CA value of $\cos\theta$ ✓CA answer (4)
		[9]

QUESTION 9

9.1	$O\hat{M}B = 90°$	[∠ in a semi circle]	✓S ✓R
	MB = AM = 12 units	[line from centre ⊥ to chord]	✓S/R
	$OB^2 = OM^2 + MB^2$ $= 5^2 + 12^2$	[Pythagoras]	
	∴ radius = OB = 13 units		✓CA answer (4)
	OR		**OR**
	$O\hat{M}B = 90°$	[∠ in a semi circle]	✓S ✓R
	$\therefore O\hat{M}A = 90°$	[∠s on a straight line]	✓S/R
	$OA^2 = OM^2 + AM^2$ $= 5^2 + 12^2$	[Pythagoras]	
	∴ radius = OA = 13 units		✓CA answer (4)
9.2	$\hat{D} = \hat{C}$ $= 28°$	[∠s in the same segment]	✓S ✓R
	$\hat{B}_1 = 180° - (28° + 37° + 40°)$ $= 75°$	[sum of ∠s of ΔABD]	✓R ✓CA answer (4)
9.3	$A\hat{C}D = \hat{B}$ $= 125°$	[tan-chord theorem]	✓R ✓S size of $A\hat{C}D$
	$\hat{C}_3 = 90°$	[radius ⊥ tangent]	✓S/R
	$\hat{C}_2 = 125° - 90° = 35°$		✓CA answer (4)
	OR		**OR**
	$\hat{O}_2 = 2 \times \hat{B}$ $= 250°$	[∠ at centre = 2×∠ at circumf.]	✓R ✓S size of $\hat{O}_2$
	$\hat{O}_1 = 360° - \hat{O}_2$ $= 360° - 250° = 110°$	[∠s around a point]	✓S size of $\hat{O}_1$
	$\hat{C}_1 = \hat{A}_1$	[∠s opp. = sides]	
	$\hat{C}_2 = \frac{125° - 110°}{2} = 35°$	[sum of ∠s of ΔAOC]	✓CA answer (4)
			[12]

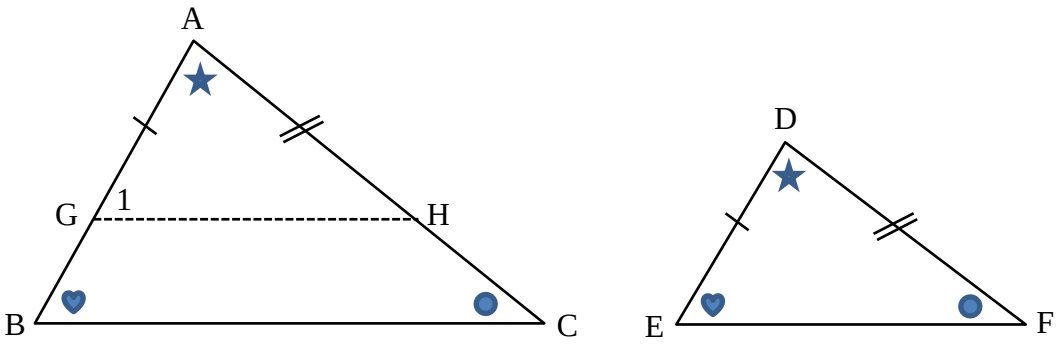
QUESTION 10



10.1	$\frac{AF}{FE}=\frac{5}{3}$ [prop. theorem, BF||CE]	✓S ✓R (2)
10.2	From sketch: $8p=4x$ $\therefore p=\frac{x}{2}$ And: $FE=\frac{3x}{2}=1,5x$ $ED:FE=3x:1,5x$ $=2:1$ $\therefore DG:GB=2:1$ [prop theorem, BF||CE]	✓S ✓S ✓S/R (3)
10.3	$\frac{\text{Area of }\Delta BCG}{\text{Area of }\Delta DGC}=\frac{\frac{1}{2}(GB).\text{height}}{\frac{1}{2}(GD).\text{height}}$ $=\frac{GB}{GD}$ [same height] $=\frac{1}{2}$	✓ substitution ✓CA answer (2)
		[7]

QUESTION 11

11.1



Mark off G and H on AB and AC respectively, such that AG = DE and AH = DF.	✓ construction
In ΔAGH and ΔDEF:	
1. $\hat{A} = \hat{D}$ [given]	
2. $AG = DE$ [construction]	
3. $AH = DF$ [construction]	
$\therefore \Delta AGH \equiv \Delta DEF$ [s ; ∠ ; s]	✓S ✓R
$\therefore \hat{G}_1 = \hat{E}$ [≡ Δs]	
$GH \parallel EF$ [corresponding ∠s are =]	✓ S/R
In ΔABC: $\frac{AG}{AB} = \frac{AH}{AC}$ [prop. theorem; $GH \parallel EF$]	✓S ✓R
Also: $\frac{DE}{AB} = \frac{DF}{AC}$ [AG = DE; AH = DF]	(6)

11.2.1	In ΔPSV and ΔPRS: 1. $\hat{P}_1 = \hat{P}_1$ [common] 2. $\hat{S}_1 = \hat{R}_1$ [given; both = x] 3. $\hat{V}_1 = P\hat{S}R$ [sum of $\angle$s of Δ] $\therefore \Delta PSV \,|||\, \Delta PRS$ [$\angle;\angle;\angle$]	✓S ✓S ✓R (3)
11.2.2	$\hat{R}_2 = 90°$ [$\angle$ in semi-circle] $\therefore S\hat{R}Q = 90° + x$ $S\hat{P}T = 90° - x$ [opp. $\angle$s of a cyclic quad.] $\hat{T}_1 = 90°$ [sum of $\angle$s of Δ] $= \hat{R}_2$ $\therefore$ VTQR is a cyclic quadrilateral [converse: ext. $\angle$ of cyclic quad]	✓S/R ✓S/R ✓S ✓R (4)
11.2.3	In ΔPRQ and ΔPTV: 1. $\hat{P}_2 = \hat{P}_2$ [common] 2. $\hat{R}_2 = \hat{T}_1$ [proved; both $= 90°$] 3. $\hat{Q} = \hat{V}_4$ [sum of $\angle$s of Δ] $\therefore \Delta PRQ \,|||\, \Delta PTV$ [$\angle;\angle;\angle$]	✓S ✓S ✓R (3)
11.2.4	From 11.2.1: $\frac{PS}{PR} = \frac{PV}{PS}$ [$|||$ Δs] $\therefore PS^2 = PR.PV$ From 11.2.3: $\frac{PR}{PT} = \frac{PQ}{PV}$ [$|||$ Δs] $\therefore PT.PQ = PR.PV$ $\therefore PT.PQ = PS^2$ [both $= PR.PV$] But: $ST^2 = PS^2 - PT^2$ [Pythagoras] $ST^2 = PT.PQ - PT^2$ $ST^2 = PT(PQ - PT)$	✓S ✓S ✓S ✓S ✓S (5)
		[21]

TOTAL: 150 MARKS

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